MARYLAND
Department of Health and Mental Hygiene

Chesapeake Bay Program
Climate Resiliency Work Group

Climate Change, Public Health, and Diversity: An Overview of Maryland's BRACE Program

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Director, Environmental Health Bureau

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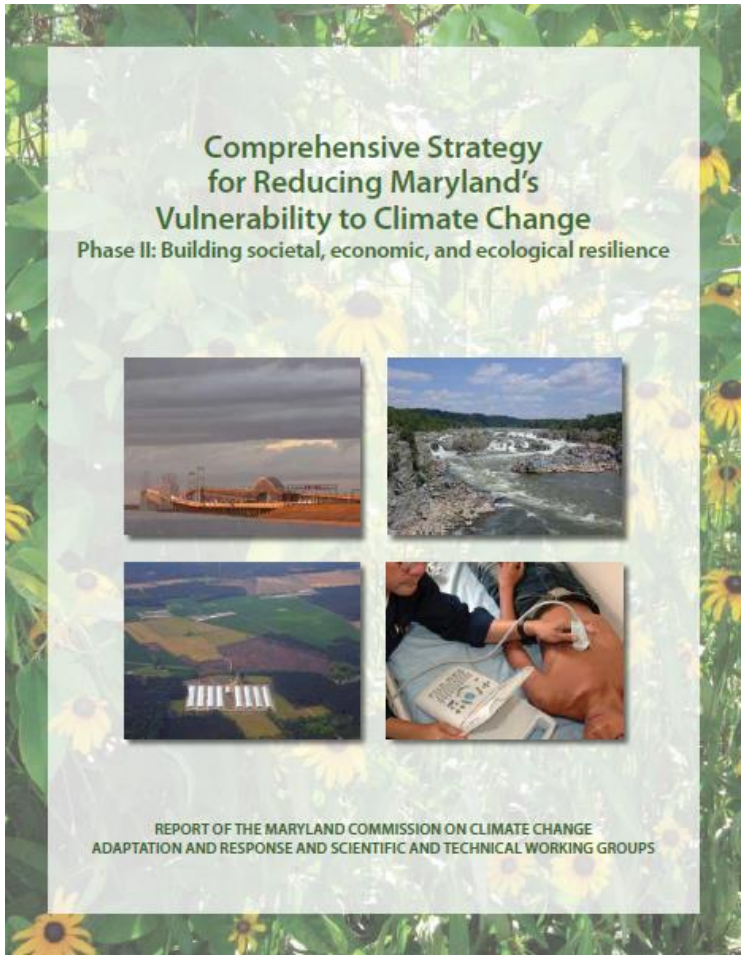
Learning Objectives

- Discuss the goals of the new Maryland Climate Change Program:
  - Identify populations not engaged in climate change discussions, or with increased vulnerability
  - Use results of Climate and Health Profile Report to guide discussion
  - Improve outreach, communications
  - Monitor adaptation implementation

Maryland Public Health Strategy for Climate Change

- Original discussion of public health impacts of climate change as part of adaptation work group for Climate Change Commission prior to 2006
- Department of Health and Mental Hygiene created Public Health Strategy for Climate Change with first CDC cooperative agreement 2012 – 2016
- New cooperative agreement 2016 – 2021

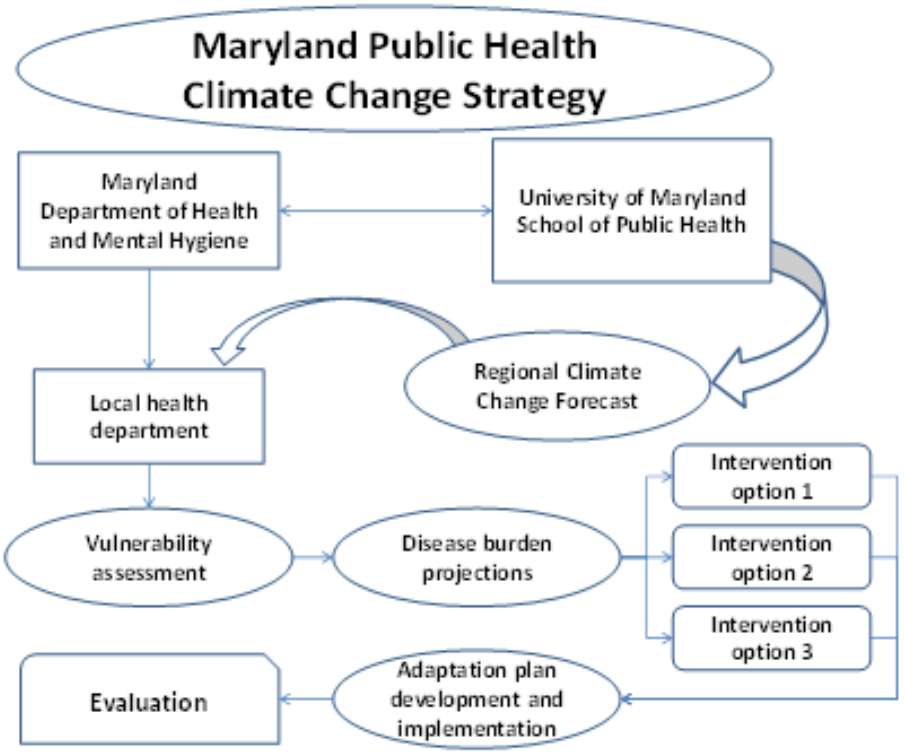
Key Recommendations for Adaptation



- Health
  - Conduct vulnerability assessments to gain a better understanding of risks and inform preventative responses
  - Integrate impact reduction strategies into State and local planning practices
  - Streamline and revise data collection and information dissemination channels

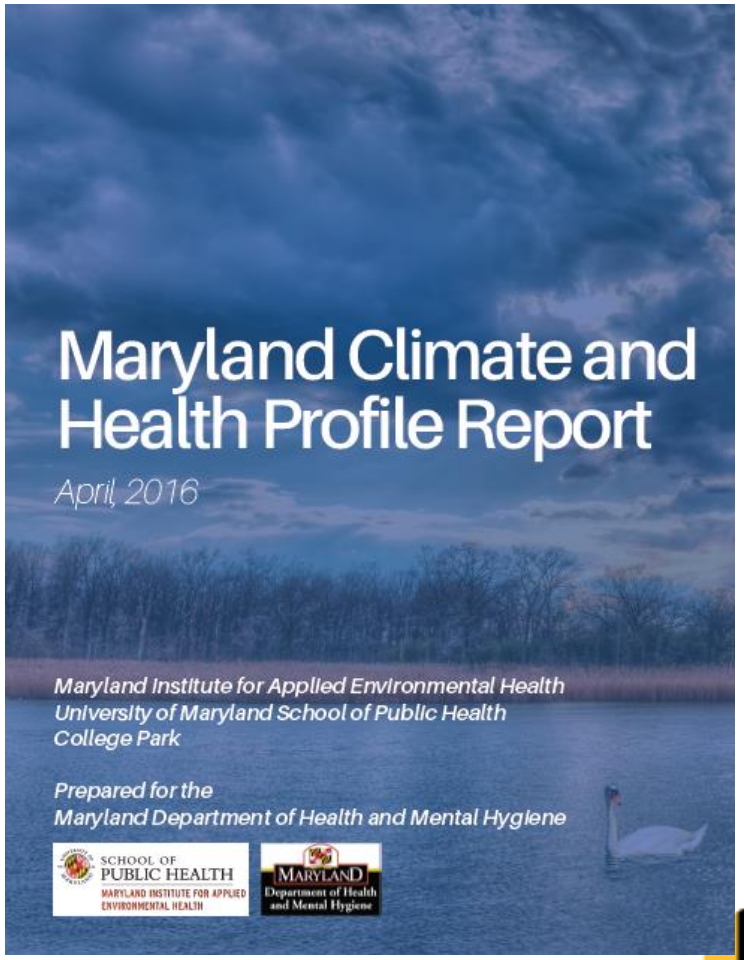
Public Health Strategy for Climate Change

- 2012 – CDC funds Maryland Public Health Strategy for Climate Change, using CDC BRACE framework (Building Resilience Against Climate Effects)
- Collaboration with UMCP, Wicomico, Prince George's, Washington Counties, Baltimore City



Climate and Health Profile Report

- Focuses on using historical health data, climate projections to anticipate likely impacts across the State
- Outcomes:
  - Injuries and temperature-related events
  - Respiratory diseases
  - Waterborne illness and injuries
  - Foodborne illness
  - Vector borne disease



Findings – Statewide and Regional

- Across the range of likely outcomes, estimated magnitude of impacts for the State as a whole:

Table 1. Projected change in disease rates associated with extreme heat events in Maryland during summer months.

HEALTH OUTCOME	RATES IN SUMMER*			PROJECTION RANKING
	2010	2040	% Change	
SALMONELLA INFECTION	6.1	7.8	28.0	SMALL
HOSPITALIZATION FOR HEART ATTACK	38.2	64.3	68.4	MODERATE
HOSPITALIZATION FOR ASTHMA	29.4	69.6	136.8	LARGE

**Rate per 100,000 residents, calculated as a seasonal average.*

- And for each pilot jurisdiction in different regions of the State:

Table 9. Projected change in disease rate in Prince George's County during summer months.

HEALTH OUTCOME	RATES IN SUMMER *			PROJECTION RANKING
	2010	2040	% Change	
SALMONELLA INFECTION	4.1	4.8	16.9	SMALL
HOSPITALIZATION FOR HEART ATTACK	24.2	29.7	22.5	SMALL
HOSPITALIZATION FOR ASTHMA	22.2	38.9	75.0	MODERATE

**=Rate per 100,000 residents, calculated as a seasonal average.*

Outreach

International Journal of *Environmental Research and Public Health*

MDPI

Article

Vulnerable Populations Perceive Their Health as at Risk from Climate Change

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Abstract: Climate change is already taking a toll on human healt
coming decades. The relationship between risk perceptions and
health threats has received little attention, even though an u
adaptation among particularly susceptible populations is b
We demonstrate that some people whose health will suffer
change—due to social vulnerability, health susceptibility, and
they are at risk. In a 2013 survey we measured Maryland resi
perceptions, and household social vulnerability characteristi
(n = 2126). We paired survey responses with secondary data so
and/or urban heat island to predict perceptions of personal a
General health risk perceptions, political ideology, and climate
Yet, people in households with the following characteristics a
members with one or more medical conditions or disabilities; lo
and residence in a floodplain. In light of these results, clima
vulnerable populations should emphasize protective actions inst

Keywords: vulnerable populations; health risk perceptions; clim

1. Introduction

Public perceptions of climate change risk have primarily been
worldviews, awareness of physical changes in the environment,
evidence [1,2]; the role of vulnerability in shaping people's asse
studied [3]. Indeed, whether vulnerability specifically due to he
perceptions of their climate change risks has been little explored.
for climate adaptation planning. Public health organizations hav
communicating with vulnerable populations in order to promote
these health threats [4]. Indeed, the Centers for Disease Control a
Climate and Health Program in 2009 [5]. Maryland participates in
Cities Initiative in which it is tasked with assessing state health vulne
developing and implementing a climate and health plan, and conduc

Soneja *et al. Environmental Health* (2016) 15:57
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Environmental Health

RESEARCH Open Access

Exposure to extreme heat and precipitation events associated with increased risk of hospitalization for asthma in Maryland, U.S.A.

Sutyajeet Soneja[1], Chengsheng Jiang[1], Jared

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events and increased ri
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events and risk of hosp
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Ratio (OR): 1.03, 95 %
heat events that occu
precipitation events i
6, 1.17). Across age gr
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Climate change, Extrem

Disease Control and
5.5 million American
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ually [1]. Annual costs
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s estimated to be $56

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Full length article

Climate change, extreme events and increased risk of salmonellosis in Maryland, USA: Evidence for coastal vulnerability

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El Niño
La Niña

ABSTRACT

Background: *Salmonella* is a leading cause of acute gastroenteritis worldwide. Patterns of salmonellosis have been linked to weather events. However, there is a dearth of data regarding the association between extreme events and risk of salmonellosis, and how this risk may disproportionately impact coastal communities.
Methods: We obtained *Salmonella* case data from the Maryland Foodborne Diseases Active Surveillance Network (2002–2012), and weather data from the National Climatic Data Center (1960–2012). We developed exposure metrics related to extreme temperature and precipitation events using a 30 year baseline (1960–1989) and linked them with county-level salmonellosis data. Data were analyzed using negative binomial Generalized Estimating Equations.
Results: We observed a 4.1% increase in salmonellosis risk associated with a 1 unit increase in extreme temperature events (incidence rate ratio (IRR):1.041; 95% confidence interval (CI):1.013–1.069). This increase in risk was more pronounced in coastal versus non-coastal areas (5.1% vs 1.5%). Likewise, we observed a 5.6% increase in salmonellosis risk (IRR:1.056; CI:1.035–1.078) associated with a 1 unit increase in extreme precipitation events, with the impact disproportionately felt in coastal areas (7.1% vs 3.6%).
Conclusions: To our knowledge, this is the first empirical evidence showing that extreme temperature/precipitation events—that are expected to be more frequent and intense in coming decades—are disproportionately impacting coastal communities with regard to salmonellosis. Adaptation strategies need to account for this differential burden, particularly in light of ever increasing coastal populations.

1. Introduction

Salmonella causes an estimated 1.2 million cases of acute gastroenteritis, including 23,000 hospitalizations and 450 deaths, in the United States each year (Scallan et al., 2011). In Maryland, 9529 cases of culture-confirmed cases of *Salmonella* infections were reported to the FoodNet program between 2002 and 2012. *Salmonella* infections have been attributed to a number of diverse sources, including produce, meats and eggs (Pires et al., 2014). Salmonellosis typically self-resolves in 5–7 days, although more serious sequelae, including septicemias and infections in immunocompromised individuals, require medical treatment (Hohmann, 2001). *Salmonella* infections proliferate during seasons characterized by elevated temperatures and precipitation, which can amplify bacterial replication and transmission to surface water and food crops, potential sources of infection (Grjibovski et al., 2014; Haley et al., 2009; Kovats et al., 2004; Lal et al., 2013; Micallef et al., 2012; Zhang et al., 2010).

Global climate change is expected to increase the frequency and intensity of extreme temperature and precipitation events (IPCC, 2013). A recent report by the Intergovernmental Panel for Climate Change (IPCC) suggests that recent trends in extreme temperature and precipitation events will continue to increase in future decades with more frequent and longer lasting heat waves (IPCC, 2013). A recent time series analysis also demonstrated a continued global increase in the frequency of the most extreme hot days over land, even during the hypothesized "global warming hiatus" (Seneviratne et al., 2014). Likewise, it is estimated that the frequency of extreme El Niño events—characterized by increased extreme heat days and heavy precipitation—will continue to rise in response to continued greenhouse warming (Cai et al., 2014).

Recent studies have provided evidence of an association between weather events and the incidence of *Salmonella* infections (Kovats

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Climate Change & Energy

Public Attitudes, Behaviors & Policy Support

A Survey of Maryland Residents | Summer 2013

GEORGE MASON UNIVERSITY

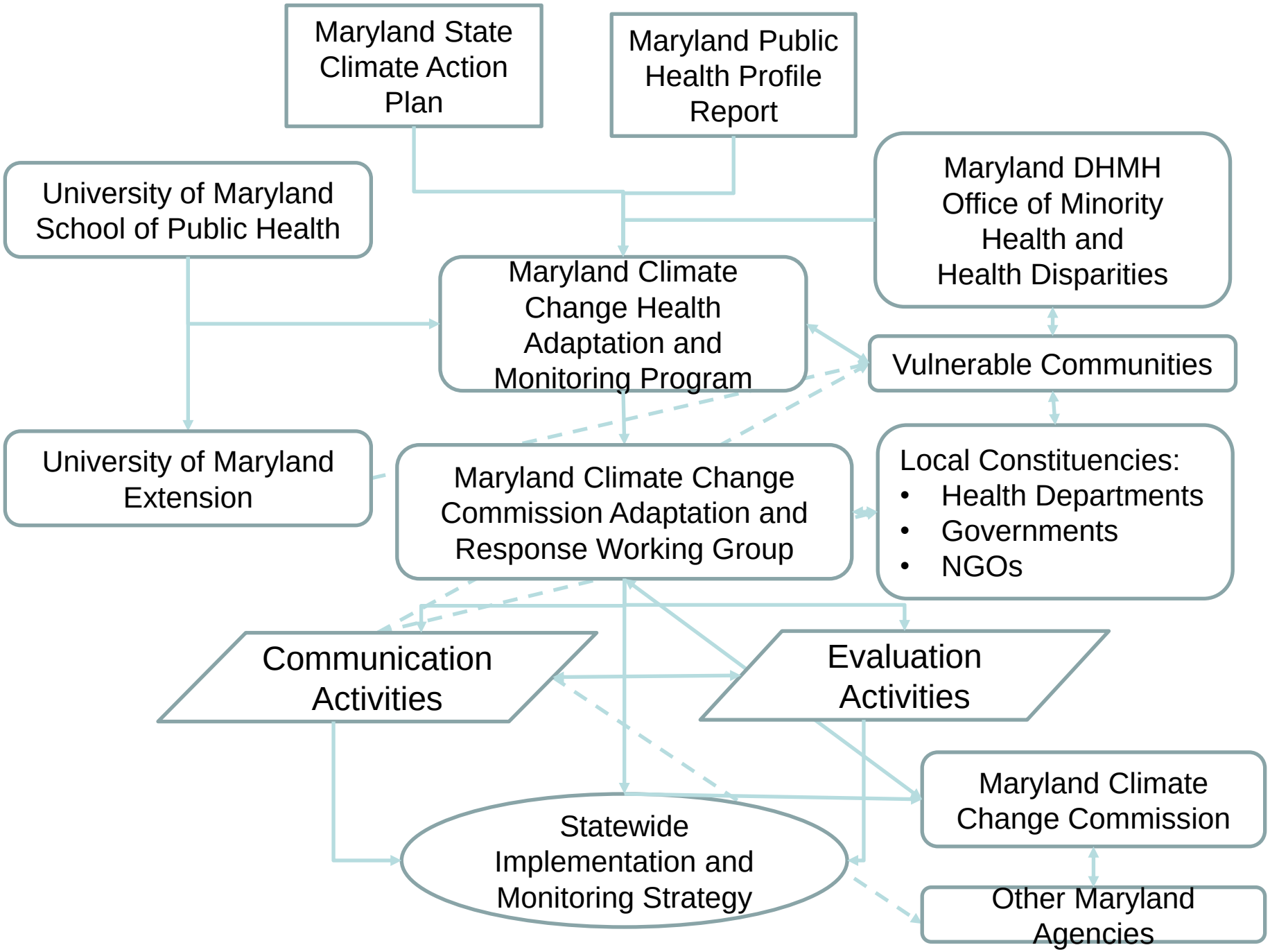
MARYLAND DEPARTMENT OF HEALTH & MENTAL HYGIENE

Next Steps

- Maryland Climate Commission Adaptation and Response Working Group
- Continuing work on climate-health projections for State, and for local jurisdictions and planners
- Public engagement around adaptation planning
- Use of Environmental Public Health Tracking, other data display tools to help make data and projections available to individuals and groups

Maryland Climate Change Health Adaptation Program (MCCHAP)

- Cooperative agreement with CDC for 5 years (2016 – 2021)
- Goals:
  1. Develop overall statewide implementation and monitoring strategy for climate change health adaptation efforts that is integrated with the Maryland Climate Plan
  2. Provide tools and technical assistance to communities and other stakeholders on evidence-based public health interventions for climate adaptation
  3. Institute a surveillance system for climate interventions and their associated health outcomes as they are implemented
  4. Use surveillance results to further refine and improve state and local interventions
  5. Measure and communicate the health impacts of those interventions


Maryland State Climate Action Plan
Maryland Public Health Profile Report
University of Maryland School of Public Health
Maryland DHMH Office of Minority Health and Health Disparities
Maryland Climate Change Health Adaptation and Monitoring Program
Vulnerable Communities
University of Maryland Extension
Maryland Climate Change Commission Adaptation and Response Working Group
Local Constituencies:
• Health Departments
• Governments
• NGOs
Communication Activities
Evaluation Activities
Maryland Climate Change Commission
Statewide Implementation and Monitoring Strategy
Other Maryland Agencies

Year 1 – Planning and Recruitment

- Identify and strengthen relationships with old and new stakeholders, including representatives from vulnerable populations
- Based on the State Climate Action Plan, develop an overall Maryland Implementation and Monitoring Strategy (IMS) for climate change health adaptation efforts
- Develop a plan for communicating the IMS to community, leaders, and other relevant stakeholders
- Communicate and disseminate IMS to key stakeholders
- Develop evaluation plan for IMS and associated interventions

Years 2 – 4 Implementation/Evaluation

- Diverse projects across the State
- Will be consistent with State Climate Change Plan
- Tools such as Environmental Public Health Tracking